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Improvement of effectiveness of separation of emulsion by processing Ptfе membrane with microwave radiation

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Abstract

© 2016 Authors. In this work, in order to increase the productivity and degree of separation of petroleum emulsions, a modification of thinfilm microfiltration membranes from polytetrafluoroethylene (PTFE) by ultrahigh-frequency (microwave) radiation in the decimeter wave band in air, nitrogen and argon was carried out. Treatment of membranes with microwave radiation leads to a reduction in the mass of PTFE membranes depending on the treatment time and the gaseous media. The membrane weight decreases most strongly to 0.17% when treated in atmospheric air, which is apparently due to the aggressive action of oxygen. The least mass of the membrane decreases when treated in argon, only 0.06%. The increase in the specific productivity of membranes during processing in the atmosphere of atmospheric air is explained by the hydrophilization of the surface, due to the formation of polar oxygen-containing groups. A decrease in specific productivity when treated in an argon inert gas environment occurs apparently due to crosslinking of the surface layer. Treatment of the membrane in a nitrogen medium increases the degree of emulsion separation by 6.9%, in air media by 15.3%, in argon media by 21%. An increase in the efficiency of separation of emulsions is also confirmed by a decrease in the size of oil particles in filtrates of emulsions. So the limiting size of the particles of the disperse phase cut off by the initial membrane was 118 nm, and the membrane treated with microwave radiation in the air medium was 39 nm, in the nitrogen medium 68 nm and in argon medium 10 nm. © 2018 Authors.

Keywords

Argon, Microfiltration, Microwave radiation, Nitrogen, Particle size, Petroleum products, PTFE, The oil-in-water emulsion

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